CLAIMS

What is claimed is:

1. An apparatus for analyzing a multi-component gas mixture, comprising:

(a) an array of four or more chemo/electro-active materials, each chemo/electro-active material exhibiting a different electrical response characteristic, upon exposure at a selected temperature to the gas mixture, than each of the other chemo/electro-active materials;

wherein the chemo/electro-active materials are selected from the group consisting of (i) at least one chemo/electro-active material that comprises M^1O_x, and (ii) at least three chemo/electro-active materials each of which comprises $M^1_aM^2_bO_x$;

wherein M^1 is selected from the group consisting of Al, Ce, Cr, Cu, Fe, Ga, Mn, Nb, Nd, Ni, Pr, Sb, Sn, Ta, Ti, W and Zn;

wherein M^2 is selected from the group consisting of Ga, La, Mn, Ni, Sn, Sr, Ti, W, Y, Zn;

wherein M^1 and M^2 are each different in $M^1_aM^2_bO_x$;

wherein a, b and c are each independently about 0.0005 to about 1; and

wherein x is a number sufficient so that the oxygen present balances the charges of the other elements in the chemo/electro-active material; and

(b) means for determining the electrical response of each chemo/electro-active material upon exposure of the array to the gas mixture.

2. An apparatus according to Claim 1 that comprises an array of five or more chemo/electro-active materials wherein the chemo/electro-active materials are selected from the group consisting of at least four chemo/electro-active materials each of which comprises $M^1_aM^2_bO_x$.

3. An apparatus according to Claim 1 that comprises an array of six or more chemo/electro-active materials wherein the chemo/electro-active materials are selected from the group consisting of at least five chemo/electro-active materials each of which comprises $M^1_aM^2_bO_x$.

4. An apparatus for analyzing a multi-component gas mixture, comprising:

(a) an array of four or more chemo/electro-active materials, each chemo/electro-active material exhibiting a different electrical response characteristic, upon exposure at a selected temperature to the gas mixture, than each of the other chemo/electro-active materials;

wherein the chemo/electro-active materials are selected from the group consisting of (i) at least two chemo/electro-active materials each of which comprises M^1O_x, and (ii) at least two chemo/electro-active materials each of which comprises $M^1_aM^2_bO_x$;

wherein M^1 is selected from the group consisting of Al, Ce, Cr, Cu, Fe, Ga, Mn, Nb, Nd, Ni, Pr, Sb, Sn, Ta, Ti, W and Zn;

wherein M^2 is selected from the group consisting of Ga, La, Mn, Ni, Sn, Sr, Ti, W, Y, Zn;

wherein M^1 and M^2 are each different in $M^1_aM^2_bO_x$;

wherein a, b and c are each independently about 0.0005 to about 1; and

wherein x is a number sufficient so that the oxygen present balances the charges of the other elements in the chemo/electro-active material; and

(b) means for determining the electrical response of each chemo/electro-active material upon exposure of the array to the gas mixture.

5. An apparatus according to Claim 4 that comprises an array of five or more chemo/electro-active materials wherein the chemo/electro-active materials are selected from the group consisting of at least three chemo/electro-active materials each of which comprises $M^1_aM^2_bO_x$.

6. An apparatus according to Claim 4 that comprises an array of six or more chemo/electro-active materials wherein the chemo/electro-active materials are selected from the group consisting of at least four chemo/electro-active materials each of which comprises $M^1_aM^2_bO_x$.

7. An apparatus for analyzing a multi-component gas mixture, comprising:

(a) an array of four or more chemo/electro-active materials, each chemo/electro-active material exhibiting a different electrical response characteristic, upon exposure at a selected temperature to the gas mixture, than each of the other chemo/electro-active materials;

wherein the chemo/electro-active materials are selected from the group consisting of (i) at least one chemo/electro-active material that comprises M^1O_x, (ii) at least two chemo/electro-active materials each of which comprises $M^1_aM^2_bO_x$, and (iii) at least one chemo/electro-active material that comprises $M^1_aM^2_bM^3_cO_x$;

wherein M^1 is selected from the group consisting of Al, Ce, Cr, Cu, Fe, Ga, Mn, Nb, Nd, Ni, Pr, Sb, Sn, Ta, Ti, W and Zn;

wherein M^2 and M^3 are each independently selected from the group consisting of Ga, La, Mn, Ni, Sn, Sr, Ti, W, Y, Zn;

wherein M^1 and M^2 are each different in $M^1_aM^2_bO_x$, and M^1, M^2 and M^3 are each different in $M^1_aM^2_bM^3_cO_x$;

wherein a, b and c are each independently about 0.0005 to about 1; and

wherein x is a number sufficient so that the oxygen present balances the charges of the other elements in the chemo/electro-active material; and

(b) means for determining the electrical response of each chemo/electro-active material upon exposure of the array to the gas mixture.

8. An apparatus according to Claim 7 that comprises an array of five or more chemo/electro-active materials wherein the chemo/electro-active materials are selected from the group consisting of at least three chemo/electro-active materials each of which comprises $M^1_aM^2_bO_x$.

9. An apparatus according to Claim 7 that comprises an array of six or more chemo/electro-active materials wherein the chemo/electro-active materials are selected from the group consisting of at least four chemo/electro-active materials each of which comprises $M^1_aM^2_bO_x$.

10. An apparatus for analyzing a multi-component gas mixture, comprising:

(a) an array of four or more chemo/electro-active materials, each chemo/electro-active material exhibiting a different electrical response

characteristic, upon exposure at a selected temperature to the gas mixture, than each of the other chemo/electro-active materials;

wherein the chemo/electro-active materials are selected from the group consisting of (i) at least two chemo/electro-active material that comprises M^1O_x, (ii) at least one chemo/electro-active materials each of which comprises $M^1_aM^2_bO_x$, and (iii) at least one chemo/electro-active material that comprises $M^1_aM^2_bM^3_cO_x$;

wherein M^1 is selected from the group consisting of Al, Ce, Cr, Cu, Fe, Ga, Mn, Nb, Nd, Ni, Pr, Sb, Sn, Ta, Ti, W and Zn;

wherein M^2 and M^3 are each independently selected from the group consisting of Ga, La, Mn, Ni, Sn, Sr, Ti, W, Y, Zn;

wherein M^1 and M^2 are each different in $M^1_aM^2_bO_x$, and M^1, M^2 and M^3 are each different in $M^1_aM^2_bM^3_cO_x$;

wherein a, b and c are each independently about 0.0005 to about 1; and

wherein x is a number sufficient so that the oxygen present balances the charges of the other elements in the chemo/electro-active material; and

(b) means for determining the electrical response of each chemo/electro-active material upon exposure of the array to the gas mixture.

11. An apparatus according to Claim 10 that comprises an array of five or more chemo/electro-active materials wherein the chemo/electro-active materials are selected from the group consisting of at least two chemo/electro-active materials each of which comprises $M^1_aM^2_bO_x$.

12. An apparatus according to Claim 10 that comprises an array of six or more chemo/electro-active

materials wherein the chemo/electro-active materials are selected from the group consisting of at least three chemo/electro-active materials each of which comprises $M^1_aM^2_bO_x$.

13. An apparatus for analyzing a multi-component gas mixture, comprising:

(a) an array of four or more chemo/electro-active materials, each chemo/electro-active material exhibiting a different electrical response characteristic, upon exposure at a selected temperature to the gas mixture, than each of the other chemo/electro-active materials;

wherein the chemo/electro-active materials are selected from the group consisting of (i) at least three chemo/electro-active materials each of which comprises $M^1_aM^2_bO_x$, and (ii) at least one chemo/electro-active material that comprises $M^1_aM^2_bM^3_cO_x$;

wherein M^1 is selected from the group consisting of Al, Ce, Cr, Cu, Fe, Ga, Mn, Nb, Nd, Ni, Pr, Sb, Sn, Ta, Ti, W and Zn;

wherein M^2 and M^3 are each independently selected from the group consisting of Ga, La, Mn, Ni, Sn, Sr, Ti, W, Y, Zn;

wherein M^1 and M^2 are each different in $M^1_aM^2_bO_x$, and M^1, M^2 and M^3 are each different in $M^1_aM^2_bM^3_cO_x$;

wherein a, b and c are each independently about 0.0005 to about 1; and

wherein x is a number sufficient so that the oxygen present balances the charges of the other elements in the chemo/electro-active material; and

(b) means for determining the electrical response of each chemo/electro-active material upon exposure of the array to the gas mixture.

14. An apparatus according to Claim 13 that comprises an array of five or more chemo/electro-active materials wherein the chemo/electro-active materials are selected from the group consisting of at least four chemo/electro-active materials each of which comprises $M^1_aM^2_bO_x$.

15. An apparatus according to Claim 13 that comprises an array of six or more chemo/electro-active materials wherein the chemo/electro-active materials are selected from the group consisting of at least five chemo/electro-active materials each of which comprises $M^1_aM^2_bO_x$.

16. An apparatus for analyzing a multi-component gas mixture, comprising:

(a) an array of four or more chemo/electro-active materials, each chemo/electro-active material exhibiting a different electrical response characteristic, upon exposure at a selected temperature to the gas mixture, than each of the other chemo/electro-active materials;

wherein the chemo/electro-active materials are selected from the group consisting of (i) the chemo/electro-active materials that comprise M^1O_x, (ii) the chemo/electro-active materials that comprise $M^1_aM^2_bO_x$, and (iii) the chemo/electro-active materials that comprise $M^1_aM^2_bM^3_cO_x$;

wherein M^1 is selected from the group consisting of Al, Ce, Cr, Cu, Fe, Ga, Mn, Nb, Nd, Ni, Pr, Sb, Sn, Ta, Ti, W and Zn;

wherein M^2 and M^3 are each independently selected from the group consisting of Ga, La, Mn, Ni, Sn, Sr, Ti, W, Y, Zn;

wherein M^1 and M^2 are each different in $M^1_aM^2_bO_x$, and M^1, M^2 and M^3 are each different in $M^1_aM^2_bM^3_cO_x$;

wherein a, b and c are each independently about 0.0005 to about 1; and

wherein x is a number sufficient so that the oxygen present balances the charges of the other elements in the chemo/electro-active material; and

(b) a heater to continually maintain the chemo/electro-active materials at a minimum temperature of about 500°C or above;

(c) means for determining an individual electrical response of each chemo/electro-active material upon exposure of the array to the gas mixture; and

(d) means for obtaining, from no information about the gas mixture other than the individual electrical response of the chemo/electro-active materials, a determination related to the presence or concentration of a component in the gas mixture.

17. An apparatus according to Claim 1, 4, 7, 10, 13 and 16 wherein a chemo/electro-active material that comprises $M^1_aM^2_bO_x$ is selected from the group consisting of

a chemo/electro-active material that comprises $Al_aNi_bO_x$

a chemo/electro-active material that comprises $Cr_aMn_bO_x$,

a chemo/electro-active material that comprises $Cr_aY_bO_x$

a chemo/electro-active material that comprises $Cu_aGa_bO_x$,

a chemo/electro-active material that comprises $Cu_aLa_bO_x$

a chemo/electro-active material that comprises $Fe_aLa_bO_x$

a chemo/electro-active material that comprises $Fe_aNi_bO_x$

a chemo/electro-active material that comprises $Fe_aTi_bO_x$

a chemo/electro-active material that comprises $Mn_aTi_bO_x$

a chemo/electro-active material that comprises $Nd_aSr_bO_x$,

a chemo/electro-active material that comprises $Nb_aTi_bO_x$

a chemo/electro-active material that comprises $Nb_aW_bO_x$

a chemo/electro-active material that comprises $Ni_aZn_bO_x$

a chemo/electro-active material that comprises $Sb_aSn_bO_x$.

a chemo/electro-active material that comprises $Ta_aTi_bO_x$, and

a chemo/electro-active material that comprises $Ti_aZn_bO_x$.

18. An apparatus according to Claim 1, 4, 7, 10, 13 and 16 wherein a chemo/electro-active material that comprises $M^1_aM^2_bM^3_cO_x$ is selected from the group consisting of

a chemo/electro-active material that comprises $Ga_aTi_bZn_cO_x$

a chemo/electro-active material that comprises $Nb_aTi_bZn_cO_x$

19. An apparatus for analyzing a multi-component gas mixture, comprising:

(a) an array of three or more chemo/electro-active materials, each chemo/electro-active material exhibiting a different electrical response characteristic, upon exposure at a selected temperature to the gas mixture, than each of the other chemo/electro-active materials;

wherein the chemo/electro-active materials are selected from the group consisting of (i) the chemo/electro-active materials that comprise M^1O_x, (ii) the chemo/electro-active materials that comprise $M^1_aM^2_bO_x$, and (iii) the chemo/electro-active materials that comprise $M^1_aM^2_bM^3_cO_x$;

wherein M^1 is selected from the group consisting of Al, Ce, Cr, Cu, Fe, Ga, Mn, Nb, Nd, Ni, Pr, Sb, Sn, Ta, Ti, W and Zn;

wherein M^2 and M^3 are each independently selected from the group consisting of Ga, La, Mn, Ni, Sn, Sr, Ti, W, Y, Zn;

wherein M^1 and M^2 are each different in $M^1_aM^2_bO_x$, and M^1, M^2 and M^3 are each different in $M^1_aM^2_bM^3_cO_x$;

wherein a, b and c are each independently about 0.0005 to about 1; and

wherein x is a number sufficient so that the oxygen present balances the charges of the other elements in the chemo/electro-active material; and

(b) means for determining an individual electrical response of each chemo/electro-active material upon exposure of the array to the gas mixture;

wherein at least three chemo/electro-active materials comprise a group of three materials selected from one of the following groups

the group of chemo/electro-active materials comprising, respectively, $Al_aNi_bO_x$, $Cr_aTi_bO_x$, and $Fe_aLa_bO_x$;

the group of chemo/electro-active materials comprising, respectively, $Cr_aTi_bO_x$, $Fe_aLa_bO_x$, and $Fe_aNi_bO_x$;

the group of chemo/electro-active materials comprising, respectively, $Fe_aLa_bO_x$, $Fe_aNi_bO_x$, and $Ni_aZn_bO_x$;

the group of chemo/electro-active materials comprising, respectively, $Fe_aNi_bO_x$, $Ni_aZn_bO_x$, and $Sb_aSn_bO_x$;

the group of chemo/electro-active materials comprising, respectively, $Al_aNi_bO_x$, $Cr_aTi_bO_x$, and $Mn_aTi_bO_x$

the group of chemo/electro-active materials comprising, respectively, $Nb_aTi_bO_x$, $Ni_aZn_bO_x$, and $Sb_aSn_bO_x$

the group of chemo/electro-active materials comprising, respectively, $Ni_aZn_bO_x$, $Sb_aSn_bO_x$, and $Ta_aTi_bO_x$

the group of chemo/electro-active materials comprising, respectively, $Sb_aSn_bO_x$, $Ta_aTi_bO_x$, and $Ti_aZn_bO_x$

the group of chemo/electro-active materials comprising, respectively, $Cr_aMn_bO_x$, $Cr_aTi_bO_x$, and $Cr_aY_bO_x$

the group of chemo/electro-active materials comprising, respectively, $Cr_aTi_bO_x$, $Cr_aY_bO_x$, and $Cu_aGa_bO_x$

the group of chemo/electro-active materials comprising, respectively, $Cr_aY_bO_x$, $Cu_aGa_bO_x$, and $Cu_aLa_bO_x$

the group of chemo/electro-active materials comprising, respectively, $Cu_aGa_bO_x$, $Cu_aLa_bO_x$, and $Fe_aLa_bO_x$

the group of chemo/electro-active materials comprising, respectively, $Cr_aY_bO_x$, $Cu_aGa_bO_x$,, and $Cu_aLa_bO_x$

the group of chemo/electro-active materials comprising, respectively, $Cu_aGa_bO_x$, $Cu_aLa_bO_x$, and $Fe_aTi_bO_x$

the group of chemo/electro-active materials comprising, respectively, $Cr_aMn_bO_x$, $Mn_aTi_bO_x$, and $Nd_aSr_bO_x$

the group of chemo/electro-active materials comprising, respectively, $Cr_aTi_bO_x$, $Mn_aTi_bO_x$, and $Nb_aTi_bZn_cO_x$

the group of chemo/electro-active materials comprising, respectively, $Mn_aTi_bO_x$, $Nb_aTi_bZn_cO_x$, and $Ta_aTi_bO_x$

the group of chemo/electro-active materials comprising, respectively, $Nb_aTi_bZn_cO_x$, $Ta_aTi_bO_x$, and $Ti_aZn_bO_x$

the group of chemo/electro-active materials comprising, respectively, $Ga_aTi_bZn_cO_x$, $Nb_aTi_bO_x$, and $Ni_aZn_bO_x$

the group of chemo/electro-active materials comprising, respectively, $Nb_aTi_bO_x$, $Ni_aZn_bO_x$, and SnO_2

the group of chemo/electro-active materials comprising, respectively, $Ni_aZn_bO_x$, SnO_2, and $Ta_aTi_bO_x$

the group of chemo/electro-active materials comprising, respectively, SnO_2, $Ta_aTi_bO_x$, and $Ti_aZn_bO_x$

the group of chemo/electro-active materials comprising, respectively, $Ta_aTi_bO_x$, $Ti_aZn_bO_x$, and ZnO

the group of chemo/electro-active materials comprising, respectively, $Al_aNi_bO_x$, $Cr_aMn_bO_x$, and CuO

the group of chemo/electro-active materials comprising, respectively, $Cr_aMn_bO_x$, CuO, and $Nd_aSr_bO_x$

the group of chemo/electro-active materials comprising, respectively, CuO, $Nd_aSr_bO_x$, and Pr_6O_{11}

the group of chemo/electro-active materials comprising, respectively, $Nd_aSr_bO_x$, Pr_6O_{11}, and WO_3

the group of chemo/electro-active materials comprising, respectively, $Cu_aLa_bO_x$, $Fe_aTi_bO_x$, and $Ga_aTi_bZn_cO_x$;

the group of chemo/electro-active materials comprising, respectively, $Fe_aTi_bO_x$, $Ga_aTi_bZn_cO_x$, and $Nb_aW_bO_x$;

wherein a, b, c and x are as set forth above.

20. An apparatus for analyzing a multi-component gas mixture, comprising:

(a) an array of four or more chemo/electro-active materials, each chemo/electro-active material exhibiting a different electrical response characteristic, upon exposure at a selected temperature to the gas mixture, than each of the other chemo/electro-active materials;

wherein the chemo/electro-active materials are selected from the group consisting of (i) the chemo/electro-active materials that comprise M^1O_x, (ii) the chemo/electro-active materials that comprise $M^1{}_aM^2{}_bO_x$, and (iii) the chemo/electro-active materials that comprise $M^1{}_aM^2{}_bM^3{}_cO_x$;

wherein M^1 is selected from the group consisting of Al, Ce, Cr, Cu, Fe, Ga, Mn, Nb, Nd, Ni, Pr, Sb, Sn, Ta, Ti, W and Zn;

wherein M^2 and M^3 are each independently selected from the group consisting of Ga, La, Mn, Ni, Sn, Sr, Ti, W, Y, Zn;

wherein M^1 and M^2 are each different in $M^1_aM^2_bO_x$, and M^1, M^2 and M^3 are each different in $M^1_aM^2_bM^3_cO_x$;

wherein a, b and c are each independently about 0.0005 to about 1; and

wherein x is a number sufficient so that the oxygen present balances the charges of the other elements in the chemo/electro-active material; and

(b) means for determining an individual electrical response of each chemo/electro-active material upon exposure of the array to the gas mixture;

wherein at least four chemo/electro-active materials comprise a group of four materials selected from one of the following groups

the group of chemo/electro-active materials comprising, respectively, $Ga_aTi_bZn_cO_x$, $Nb_aTi_bO_x$, $Ni_aZn_bO_x$, and SnO_2

the group of chemo/electro-active materials comprising, respectively, $Nb_aTi_bO_x$, $Ni_aZn_bO_x$, $Sb_aSn_bO_x$, and ZnO

the group of chemo/electro-active materials comprising, respectively, $Ni_aZn_bO_x$, $Sb_aSn_bO_x$, $Ta_aTi_bO_x$, and ZnO; and

the group of chemo/electro-active materials comprising, respectively, $Sb_aSn_bO_x$, $Ta_aTi_bO_x$, $Ti_aZn_bO_x$, and ZnO;

wherein a, b, c and x are as set forth above.

21. An apparatus for analyzing a multi-component gas mixture, comprising:

(a) an array of six or more chemo/electro-active materials, each chemo/electro-active material exhibiting a different electrical response characteristic, upon exposure at a selected temperature to the gas mixture, than each of the other chemo/electro-active materials;

wherein the chemo/electro-active materials are selected from the group consisting of (i) the chemo/electro-active materials that comprise M^1O_x, (ii) the chemo/electro-active materials that comprise $M^1_aM^2_bO_x$, and (iii) the chemo/electro-active materials that comprise $M^1_aM^2_bM^3_cO_x$;

wherein M^1 is selected from the group consisting of Al, Ce, Cr, Cu, Fe, Ga, Mn, Nb, Nd, Ni, Pr, Sb, Sn, Ta, Ti, W and Zn;

wherein M^2 and M^3 are each independently selected from the group consisting of Ga, La, Mn, Ni, Sn, Sr, Ti, W, Y, Zn;

wherein M^1 and M^2 are each different in $M^1_aM^2_bO_x$, and M^1, M^2 and M^3 are each different in $M^1_aM^2_bM^3_cO_x$;

wherein a, b and c are each independently about 0.0005 to about 1; and

wherein x is a number sufficient so that the oxygen present balances the charges of the other elements in the chemo/electro-active material; and

(b) means for determining an individual electrical response of each chemo/electro-active material upon exposure of the array to the gas mixture;

wherein at least six chemo/electro-active materials comprise a group of four materials selected from one of the following groups

the group of chemo/electro-active materials comprising, respectively, $Cr_aMn_bO_x$, $Mn_aTi_bO_x$, $Nd_aSr_bO_x$, $Nb_aTi_bZn_cO_x$, Pr_6O_{11}, and $Ti_aZn_bO_x$

the group of chemo/electro-active materials comprising, respectively, $Al_aNi_bO_x$, $Cr_aTi_bO_x$, $Fe_aLa_bO_x$, $Fe_aNi_bO_x$, $Ni_aZn_bO_x$, and $Sb_aSn_bO_x$

the group of chemo/electro-active materials comprising, respectively, $Al_aNi_bO_x$, $Cr_aTi_bO_x$, $Mn_aTi_bO_x$, $Nb_aTi_bZn_cO_x$, $Ta_aTi_bO_x$, and $Ti_aZn_bO_x$

the group of chemo/electro-active materials comprising, respectively, $Ga_aTi_bZn_cO_x$, $Nb_aTi_bO_x$, $Ni_aZn_bO_x$, $Sb_aSn_bO_x$, $Ta_aTi_bO_x$, and $Ti_aZn_bO_x$

the group of chemo/electro-active materials comprising, respectively, $Ga_aTi_bZn_cO_x$, $Nb_aTi_bO_x$, $Ni_aZn_bO_x$, SnO_2, $Ta_aTi_bO_x$, and $Ti_aZn_bO_x$

the group of chemo/electro-active materials comprising, respectively, $Nb_aTi_bO_x$, $Ni_aZn_bO_x$, $Sb_aSn_bO_x$, $Ta_aTi_bO_x$, $Ti_aZn_bO_x$, and ZnO

the group of chemo/electro-active materials comprising, respectively, $Cr_aMn_bO_x$, $Cr_aTi_bO_x$, $Cr_aY_bO_x$, $Cu_aGa_bO_x$, $Cu_aLa_bO_x$, and $Fe_aLa_bO_x$

the group of chemo/electro-active materials comprising, respectively, $Al_aNi_bO_x$, $Cr_aMn_bO_x$, CuO, $Nd_aSr_bO_x$, Pr_6O_{11}, and WO_3

the group of chemo/electro-active materials comprising, respectively, $Cr_aY_bO_x$, $Cu_aGa_bO_x$, , $Cu_aLa_bO_x$, $Fe_aTi_bO_x$, $Ga_aTi_bZn_cO_x$, and $Nb_aW_bO_x$; and

the group of chemo/electro-active materials comprising, respectively, $Cr_aMn_bO_x$, $Mn_aTi_bO_x$, $Nd_aSr_bO_x$, $Nb_aTi_bZn_cO_x$, Pr_6O_{11}, and $Ti_aZn_bO_x$;

wherein a, b, c and x are as set forth above.

22. An apparatus according to Claim 1, 4, 7, 10, 13, 16, 19, 20 and 21 wherein a chemo/electro-active material further comprises a frit additive.

23. An apparatus according to Claim 1 that determines the presence or concentration of a nitrogen oxide in the multi-component gas mixture.

24. An apparatus according to Claim 1 that determines the presence or concentration of a hydrocarbon in the multi-component gas mixture.

25. An apparatus according to Claim 1 that determines the presence or concentration of a nitrogen oxide and a hydrocarbon in the multi-component gas mixture.

26. An apparatus according to Claim 1 wherein the component gases in the gas mixture are not separated.

27. An apparatus according to Claim 1 wherein the electrical responses of the chemo/electro-active materials are determined upon exposure to only the multi-component gas mixture.

28. An apparatus according to Claim 1 further comprising means for calculating the concentration within the gas mixture of at least one individual gas component.

29. An apparatus according to Claim 1 wherein the multi-component gas mixture is emitted by a process, or is a product of a chemical reaction that is transmitted to a device, and wherein the apparatus further comprises means for utilizing the electrical responses for controlling the process or operation of the device.

30. A vehicle for transportation comprising an apparatus according to Claim 1.

31. Equipment for construction, maintenance or industrial operations comprising an apparatus according to Claim 1.

32. An apparatus according to Claim 1 further comprising heating means for separately heating each chemo/electro-active material.

33. An apparatus according to Claim 1 wherein each chemo/electro-active material is heated to the same temperature.

34. An apparatus according to Claim 1 wherein one or more chemo/electro-active materials is heated to a different temperature than the other chemo/electro-active materials.

35. An apparatus according to Claim 1 wherein the chemo/electro-active materials are on a substrate made from a material selected from the group consisting of silicon, silicon carbide, silicon nitride, and alumina with a resistive dopant.

36. An apparatus according to Claim 1 wherein the gas mixture comprises an organo-phosphorus gas.

37. An apparatus according to Claim 1 which may be held in the human hand.

38. An apparatus according to Claim 1 which is located in the ventilation system of a building or car.